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Down to Earth

See Page 343

A SCIENCE SERVICE PUBLICATION

MARSHAL AND

1946

WAR BARGAINS in LENSES and PRISMS

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ATTENTION!

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PHYSICS

"Second Sound" Not Heard

New sound is in range of human hearing, but apparently exists only in liquid helium at temperatures near absolute zero.

► A NEW KIND of sound has been discovered, but you won't be able to hear it. Called "second sound," the new sound is essentially a temperature wave which occurs only in liquid helium at a temperature only slightly above absolute zero.

"Second sound" was revealed by Drs. Cecil T. Lane, Lars Onsager and Henry A. Fairbank after extensive experiments with liquid helium in the Sloane Physics Laboratory of Yale University.

Although well within the range of normal hearing with a tonal frequency corresponding to about middle C, the new sound cannot be heard by the human ear. Apparently it occurs only in liquid helium and ceases when the helium's temperature rises above 2.2 degrees Centigrade over absolute zero, which is approximately 273 degrees Centigrade below zero. Waves of "second sound" travel at a speed of only about 70 feet per second compared with 700 feet per second for normal sound waves.

Temperatures within one-hundredth of one degree of absolute zero were reached in the laboratory experiments with liquid helium. Iron and steel at that temperature would shatter like glass, as would a human finger dipped into the very low temperature material.

While the research in the neighborhood of absolute zero has been limited to scientific discovery, Dr. Lane said practical applications from studies of sub-normal temperatures might produce such revolutionary developments as a new alloy which would reduce electrical resistance and expand power transmission.

He reported that other researchers have already developed delicate heat-measuring devices from low temperature research which may lead to more precise knowledge of the universe.

Describing heat in substances as "a sort of mask," Dr. Lane explained that heat causes vibrations which almost disappear at absolute zero.

"Experience with liquid helium and a temperature of absolute zero hold the

possibility of greater application of the fundamental theories behind all modern physical research," he declared.

Science News Letter, November 30, 1946

CHEMISTRY

Americium Is Purified For Study of Properties

► A THIRD of the synthetic, transuranic elements, americium, has been purified in sufficient quantities to permit a study of its chemical properties.

This was revealed for the first time by Dr. Glenn T. Seaborg, University of California nuclear chemist who was a leader in atomic bomb research.

Dr. Seaborg said that the work on americium, element 95, which was done by Dr. B. B. Cunningham at the University of Chicago Metallurgical Laboratory, was "a remarkable achievement in that the amounts available were even smaller than those in the case of neptunium and plutonium, the previously purified synthetic elements."

The scientist also revealed that curium 242, the heaviest isotope of any element so far reported, can be produced by the same chain-reacting pile technique used for obtaining plutonium. Instead of bombarding uranium with neutrons, it would be necessary to bombard americium with neutrons.

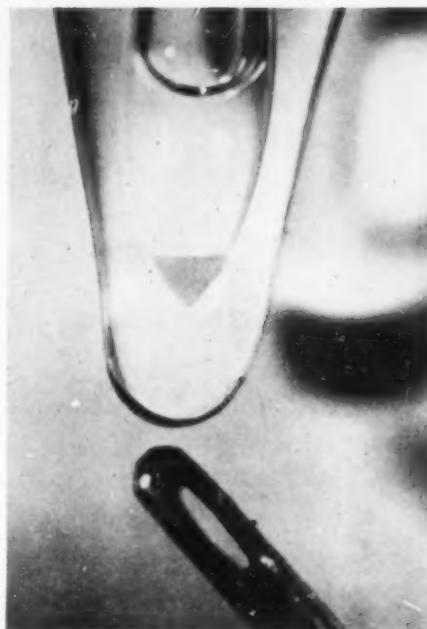
Curium is the only one of the synthetic elements not yet isolated in pure form, Dr. Seaborg pointed out. He indicated, however, that this may be possible if and when such isotopes as curium 243, 244, 245, or 246 are produced. Such isotopes, Dr. Seaborg said, may have longer lifetimes than the brief span of the curium isotopes now known.

Science News Letter, November 30, 1946

MEDICINE

Veterans Can Spread San Joaquin Valley Fever

► DISCOVERY of an unsuspected health threat from returning veterans is announced by Maj. Sol Roy Rosenthal, Army Medical Corps, and Lieut. John



AMERICIUM HYDROXIDE—The gray matter in the bottom of the capillary "test tube" is pure americium hydroxide, isolated by Dr. B. B. Cunningham. The eye of an ordinary needle is shown for comparison of size.

B. Routien, Army Sanitary Corps, at Bruns General Hospital in Santa Fe.

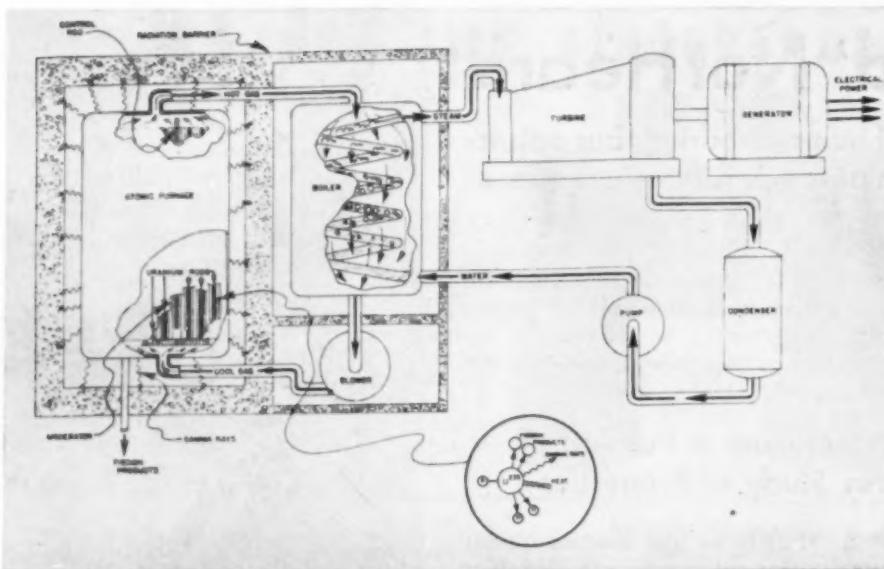
Valley fever, or San Joaquin Valley fever as it is also called, may, contrary to previous universal scientific opinion, be spread from man to animal and from animal to animal, the Army scientists report in *Science* (Nov. 22). It probably can also be spread from man to man.

Patients with this disease must therefore be considered infectious and isolated to prevent its spread until they have been proved non-infectious.

Many soldiers who trained in Texas, Arizona, New Mexico and the San Joaquin Valley, Calif., have returned home carrying the fungus that causes the disease in their bodies. Spread of the disease from them to others in many parts of the United States is possible, in view of these latest findings.

The fungus cause of the disease gets into the body by being breathed in. It may cause either a harmless, self-limiting lung disease or a progressive, chronic and malignant disease which may spread from the lung to any or all organs of the body. Medical name for the disease is coccidioidomycosis. The fungus cause is named *Coccidioides immitis*.

Science News Letter, November 30, 1946



ATOMIC POWER PILE—Diagram shows the principles of the pile, marking man's first effort to harness the atom for peacetime purposes. Construction by the Monsanto Chemical Co. probably will get under way sometime in 1947.

OCEANOGRAPHY

Sea Wave Warning Service

Principal headquarters will be in Honolulu to warn coast dwellers of approaching sea waves like the one that drowned Hawaiians last April.

► A WARNING service, to save lives and minimize property damage from earthquake-caused sea waves, is now being planned by the U. S. Coast and Geodetic Survey. It will have its principal headquarters in Honolulu, with additional seismological observatories at Sitka and College, Alaska, and at Tucson, Ariz.

Great sea waves, like the one that drowned 140 people in Hawaii last April, are caused by certain kinds of submarine earthquakes. (See *SNL*, Nov. 16, 1946.) The exact mechanism of their inception, however, is not yet understood, states Comdr. Elliott B. Roberts, chief of the Division of Geomagnetism and Seismology of the Survey, so that simply locating a submarine epicenter is not sufficient basis for predicting a sea wave. However, prompt location of epicenters is very important, so it is planned to attach alarm devices to seismographs, so that they will give notice the moment they begin to operate. It is also planned to set out newly invented wave detectors, to give notice of abnormal movements in the water near the sea

waves' points of origin.

Observation of abnormal behavior on the part of the sea among the Aleutian islands or along the upper coasts of Alaska can be made, however, by properly located watchers, including Coast Guard personnel. Radio warnings of a sea wave thus caught in the act of getting started can be sent by Army and Navy radio, so that people on threatened coasts can get to safe places, taking valuable portable property and papers with them.

Since sea waves travel at an amazingly high speed, traversing the distance from the Aleutians to Hawaii in as little as five or six hours, it will be necessary to have all the warning service set-up constantly on the alert and ready to function smoothly and with the utmost possible quickness.

Since this is a pioneering effort, it will probably require several months to give observers the necessary special training, as well as to get the interdepartmental communications system into good running order.

Science News Letter, November 30, 1946

GENERAL SCIENCE

Fellowship Grants Are Available for Students

► MORE THAN \$15,000 in research fellowships for advanced study in scientific and industrial fields will be made available for the scholastic year 1947-48 by the General Electric Company Educational Fund.

Funds from the Charles A. Coffin Foundation and the Gerard Swope Foundation are being awarded for financial assistance up to \$1,500 annually for students seeking to continue research work. An additional \$500 grant for apparatus may be made. Applications deadline for the fellowships is Jan. 1, 1947.

Science News Letter, November 30, 1946

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RADIO

Radio Waves Pass Through Non-Metals

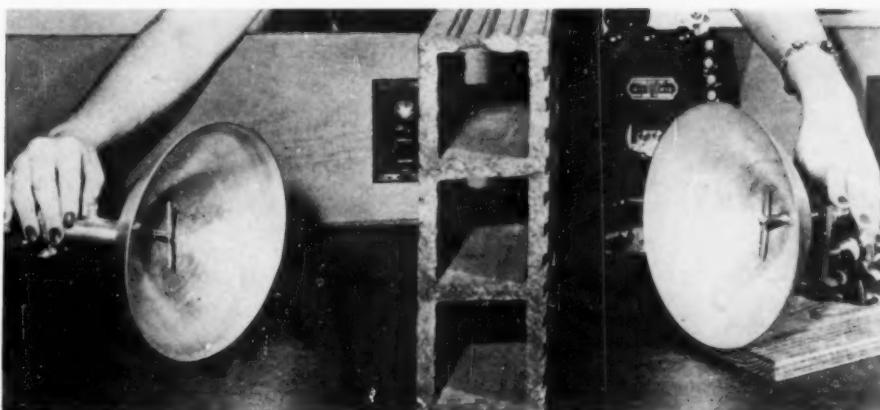
► RADIO WAVES, in a new instrument, do the work of light rays in combination with the well-known electric eye. For some purposes, it has a special advantage. It uses high frequency waves that can pass through a brick wall.

The new microwave instrument was revealed by the General Electric Company's research laboratory. Like the photoelectric cell, it can be used for counting, opening and closing, discarding and signaling. Microwaves, unlike light waves, can pass through non-metallic materials. For this reason the new device can operate through walls and partitions. Its microwaves, also, can be directed around a corner by means of a hollow metal pipe.

The transmitter of the instrument, as assembled, resembles a large flashlight, but weighs only four pounds and is small enough to hold in one hand. It is operated on ordinary household current which it converts into electromagnetic waves of about five inches in length. It uses a parabolic reflector to focus the microwaves in a beam which can be reflected from objects in a manner similar to the way radar impulses and light beams are reflected.

For receiving the radiated beam, an antenna is used, placed at the focal point of another parabolic reflector. A silicon crystal detects the microwave beam, resulting in an electric output that can be registered on a meter, or made to operate a relay which in turn activates a bell or other signaling device.

Science News Letter, November 30, 1946



SEEING THROUGH TILE—"Microwave units," General Electric devices, use high-frequency radio waves to "see" through or around solid walls.

AERONAUTICS

Infra-red Locates Planes

Infra-red rays detect planes as far away as 12 miles by the heat from their engine exhausts. German-developed devices used cesium-silver oxide.

► DETECTING a plane 12 miles away by the heat discharged from its engine exhausts was one of the accomplishments of the Germans in their war uses of the invisible infra-red rays. The development came too late to serve the Nazis to any great extent.

Germany made greater strides in developing infra-red equipment for war purposes than America or any of the other Allies, the Institute of Radio Engineers was told by Earl A. Underhill of Wright Field, where much captured Nazi equipment is being studied. The German equipment was bulky and heavy, but more efficient than American infra-red apparatus.

Image-forming detectors for night vision were one of the important devices. They shot out invisible beams of infra-red rays which were reflected back to a receiver by any object in their path. In the receiver the reflected rays were converted into a visible image. The instrument is similar to the sniperscope and snooperscope used by American soldiers, but the German device had a range of 328 yards, more than five times the range of the American equipment.

In the German instrument cesium-silver oxide is used. In this Nazi scientists may have copied an American development. Scientists of the Radio Corporation of America, using cesium, had developed in 1936 an electronic tube

which enabled its user to view a limited field illuminated only by infra-red rays.

In the receiver of the German instrument, the invisible infra-red reflections enter the cesium photocathode and are transformed to electrons which pass through grids where they are impressed with high voltage and emitted to a phosphor screen, forming a visible image of the reflecting object.

Another German development was a detector to reveal heated objects such as tanks, aircraft and seacraft motors. All heated objects emit infra-red rays, the principal heat waves given off by radiation from a heated body. The German instruments in some cases were image-forming, and in others not. With either the movements of a tank or airplane could be followed.

To detect a plane 12 miles away, an infra-red telescope was used. Variable potentiometers were provided to aid in focussing. With it, objects having a heat radiation no higher than the boiling point of water could be "seen."

Science News Letter, November 30, 1946

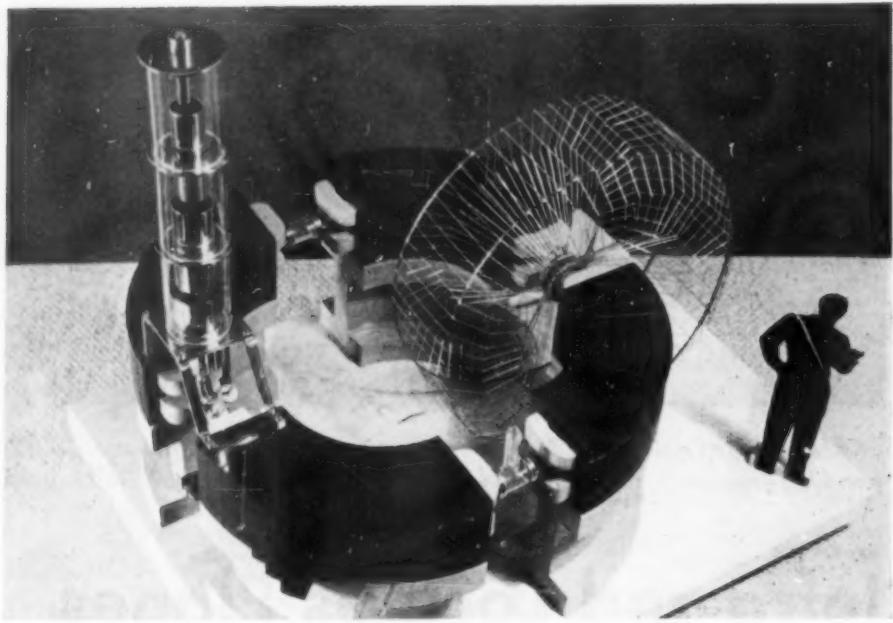
INVENTION

Same Pedal Can Be Used For Acceleration, Braking

► LOTS OF PEOPLE try to use the same pedal for both acceleration and braking—and get into trouble. But Nelson I. Perry, Chicago inventor, has devised a combination pedal that will turn the trick. To step on the gas, you tilt your foot forward. To put on the brakes, you push your foot straight down. An ingenious arrangement of links under the pedal keeps you from doing both at the same time. U. S. Patent 2,411,167 has been issued on this invention.

Science News Letter, November 30, 1946

Some prefabricated houses are of flimsy construction but over 30 of the leading manufacturers of "prefabs" meet construction standards approved by the Federal Housing Administration which assure durability, warmth and sanitation.



RACE TRACK DESIGN—The 300,000,000 volt synchrotron of which this is a model will produce energy similar to that of cosmic ray particles and permit scientists to go a step beyond atom-smashing and study sub-nuclear particles. Being built by University of Michigan physicists in association with the Applied Physics Laboratory of Johns Hopkins University under special research contracts with the Navy Bureau of Ordnance, it is made up of four quarter circles connected by straight portions. Official U. S. Navy Photograph.

HUMANICS

Humanics Answers Strife

Wars start in people, and an understanding of human nature is the only way to achieve peace, according to Dr. R. J. Williams.

► A NEW SCIENCE to achieve peace between husbands and wives, between labor and management and between nations is proposed by Dr. Roger J. Williams, University of Texas biochemistry professor and discoverer of one of the B vitamins.

"Humanics" is the name Dr. Williams gives the new science. Webster defines humanics as "the study of human nature," parallel to mechanics, dynamics, acoustics and statistics. "The science of human beings" is Dr. Williams' definition of it.

"Only by learning its basic truths, teaching them to our youth, and by extending greatly the boundaries of our knowledge," he states, "can we cope with numerous social problems: education, marriage, health, employment, charlatanism in politics and elsewhere, crime, alcoholism, group bigotry (whose name is legion), and war."

To his fellow scientists and educators Dr. Williams gives a blueprint for the science of humanics in his new book, "The Human Frontier" (Harcourt, Brace and Co., \$3.00).

It is not atom bombs and germ warfare which threaten destruction of mankind but forces within each human being, Dr. Williams charges.

Two obstacles have prevented us from advancing beyond the "ox-cart days" in applying science to human relations, he believes. One of these is the strong tendency in universities and elsewhere to study human beings piecemeal. Anatomy, physiology, biochemistry and psychology are each studied intensively but separately. No one puts together the pieces of the jigsaw puzzle of facts known about man.

The other obstacle is "our devotion to man the statistical creature." We plan for the average man, instead of for each

John and Mary.

The results are about on a par with what would happen from attempting to furnish an entire army with average-sized shoes. An average-sized shoe would fit very few soldiers, though for purposes of calculating the amount of leather required to put shoes on an army it would be valuable to know the average size of the soldiers' feet.

"If science is to go to the bottom of things in the prevention of world destruction, it must study human beings. We must take humanics seriously," Dr. Williams declares, "because we are admittedly the most complex phenomena of which we are aware. If we could understand human beings and why they behave in such outlandish fashion, we would have gained the kind of insight that is necessary."

Science News Letter, November 30, 1946

ORNITHOLOGY

Bikini Tests Did Not Harm Birds of Atoll's Islands

► BIRDS of the little islands of Bikini atoll were completely unharmed by the two atomic bursts last summer, states Melvin Traylor, Jr., Chicago Natural History Museum ornithologist who was project officer for the pelagic fishing survey preceding and during the tests.

After each of the two explosions, biologists made a careful examination of the bird life of the atoll, and found no visible effects. Subsequent examinations showed no noticeable changes in numbers, says Mr. Traylor, adding:

"The birds were continuing with their regular household routines, and were it not for the evidence of the target ships it would be difficult to believe that the bombs had actually exploded. Although there is a possibility of a delayed effect from birds eating radioactive fish, of which there were a few in the lagoon, the bird life as a whole may be considered unaffected by the bomb."

The birds of Bikini are of course mostly seabirds. Among the most notable, and certainly the most beautiful, are the pure white fairy terns, which build no nests, merely laying their eggs on bare branches where a chance rough spot on the bark or the splinters of a short-broken limb give a precarious resting place.

Another oddity noted by Mr. Traylor was the habit of the frigate birds of catching flying-fish in the air, after they have been scared out of the water by pursuing dolphins.

Science News Letter, November 30, 1946

PHOTOGRAPHY

V-2 Rocket Movies Show Earth from 65 Miles

See Front Cover

► MOTION PICTURES showing how the earth would look to a man speeding up to 65 miles above the surface in a V-2 rocket have been recovered from one of the Nazi missiles fired over the desert at White Sands, New Mexico.

The movie was made from the fuselage of a rocket fired Oct. 24, and gives a continuous motion picture of the earth's surface at altitudes from 100 feet to 65 miles. Taking the unique pictures was a camera placed in the missile by scientists from the Laboratory of Applied Physics of Johns Hopkins University.

At the peak of the rocket's flight, 65 miles above the earth's surface, a photograph of the horizon was taken showing 40,000 square miles of the earth. It is this photograph that is on the cover of this SCIENCE NEWS LETTER. At that time the horizon was theoretically 720 miles distant, and an observer aboard the rocket would actually have been able to see 1,600,000 square miles of the surface by looking in all directions. This would have included the cities of San Diego, Salt Lake City, Kansas City and San Antonio.

With the rocket flying at a top speed of 4,000 feet per second, the motion picture camera recorded 50 feet of film as the missile soared up to the 65-mile altitude and began its descent. Film ran out 45 miles above the surface on the downward flight. The pictures were made to record the roll and pitch of the V-2, necessary information for interpreting data gathered on cosmic rays and from spectrographic records.

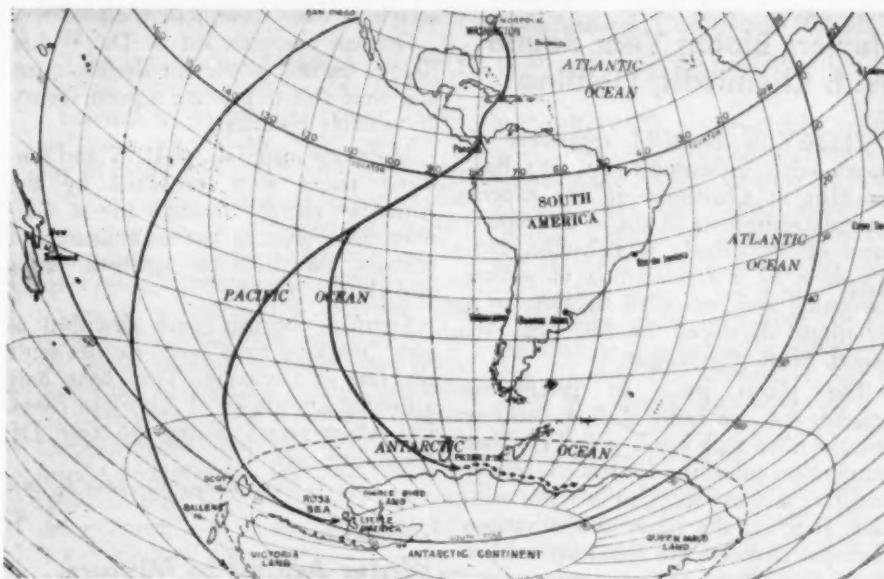
Science News Letter, November 30, 1946

NUCLEAR PHYSICS

Army Still Directing Atomic Energy Plans

► THE WAR DEPARTMENT announced the establishment of a new \$20,000,000 nuclear research laboratory to be operated by the General Electric Company near the firm's home offices at Schenectady, N. Y. Named the Knolls Atomic Power Laboratory, the new unit is the fourth in a network of national laboratories for development of atomic energy.

All such plants have been planned and



JOURNEY TO ANTARCTICA—The three main groups of the Navy's 1947 Antarctic Expedition will take these tracks. The groups are scheduled to leave the United States early in December and proceed into the Antarctic as soon as ice conditions permit. Official U. S. Navy Photograph.

announced by the War Department and its Manhattan District. These national laboratories are being set up as permanent centers of nuclear research, yet the civilian group which has been authorized to guide this program has barely been organized. Maj. Gen. L. R. Groves explains, "The work on this program began many months ago and will be transferred to the Atomic Energy Commission as a part of the broad peacetime development program."

Main argument in favor of the General's program is that a series of delays have left the wartime, Army-bossed Manhattan District the only agency which could do anything about the reconversion of atoms from bombs to peaceful pursuits.

If the Manhattan District had not gone ahead with plans for postwar development, the bomb project's vast resources would still be stalemated on a strictly military basis, losing more valuable time on the threshold of the atomic age.

The other side of the question is whether the recently-named civilian commission will agree with the planning done by their military predecessors. Instead of inheriting an atomic bomb factory and its far-flung subsidiaries, David E. Lilienthal and his fellow commissioners are getting a ready-made postwar system for the development of atomic energy.

Science News Letter, November 30, 1946

GEOGRAPHY

Byrd Leads Expedition Back to Little America

► HERE ARE some facts about the world's least known continent, Antarctica, as outlined by Rear Adm. Richard E. Byrd as he announced plans for another trek to Little America starting in a few weeks:

The southern polar continent is about the combined size of the United States and Europe, but roughly two-thirds of its 6,000,000 square miles have never been seen by man.

A coal deposit was spotted on previous trips within 150 miles of the south pole which would supply the United States with coal for 30 to 40 years.

Evidences of silver and copper have been reported. All metals will be searched for on the current trip, but uranium hunting will not be the main job, according to Admiral Byrd.

It has not definitely been determined whether the continent is one land mass or two islands. The explorer thinks it will turn out to be one solid chunk. The land of the Antarctic is not covered with ordinary ice and snow but with neve, the partially compacted, granular snow at the upper end of a glacier. This is what covered other parts of the earth during the Ice Age.

No woman has ever set foot on the world's southernmost continent.

Science News Letter, November 30, 1946

HORTICULTURE

Flowers Bloom Year Round With Chemicals, Lighting

► FLOWERS BLOOM regardless of season—chrysanthemums in spring, Easter lilies at Christmas—in the experimental greenhouses of the U. S. Department of Agriculture at Beltsville, Md. It's done by a combination of soilless gardening and controlled lighting, in a technique developed by Dr. Neil W. Stuart, plant physiologist.

The plants grow in greenhouse benches that are really shallow concrete troughs filled with sterile gravel or other nutrientless substitute for soil. Necessary fertilizer salts are supplied in water solution. Juggling the ratios of the various chemical elements can speed up or slow down the plants' tendency to produce flowers.

Further control is obtained by artificially increasing or decreasing the length of time the plants receive light each day. Some plants will not form buds and flowers until the days are growing shorter, others bloom under the stimulus of an increasing length of day. Lengthening of the day need not be continuous, it has been found; a few minutes of artificial light at midnight may have as much blossoming-control effect as full illumination from sunset onward. In commercial greenhouses this is naturally a great money-saver.

Another money-saving discovery is the use of ground-up crude phosphate rock instead of gravel as the soilless-gardening "soil." The plants get as much phosphorus as they need, without the necessity of adding costly phosphates to the nutrient solution.

Science News Letter, November 30, 1946

CHEMISTRY

German Acetylene Uses Worth Millions to U. S.

► TOP ACHIEVEMENT of Hitler's chemists was producing hundreds of synthetics from acetylene gas. That is the opinion of Dr. Oliver J. Grummitt, assistant professor of chemistry at Western Reserve University, who recently returned from an inspection of German chemical plants.

The German processes for using acetylene will be worth millions of dollars to this country. The United States has produced synthetics for plastics, rubber and other organic chemical compounds from petroleum rather than coal, because

acetylene when compressed explodes.

German chemists, led by Dr. Walter Reppe, learned to prevent the explosion and were able to produce a great variety of valuable chemicals.

More raw materials for DDT and synthetic resins were predicted by the American chemist through use of German discoveries in the manufacture of phthalic anhydride for synthetic resins and chloral for DDT.

German chemists were described as now "marking time" until treaties settle the fate of Germany. They have only a limited knowledge of American chemical achievements during the war, Dr. Grummitt said.

Science News Letter, November 30, 1946

ENGINEERING

Water Added to Mixture To Get Water from Oil

► TO GET water out of crude oil, J. A. Guyer of Bartlesville, Okla., paradoxically adds water. He also adds methane or other gas, under pressure. Release of the pressure brings out the fine water droplets, as well as tiny salt crystals, that make trouble in refining. Rights in the patent, No. 2,410,970, are assigned to the Phillips Petroleum Company.

Science News Letter, November 30, 1946

ENTOMOLOGY

Geiger-Muller Counter Tracks Down Beetles

► THE GEIGER-MULLER counter, the radiation-detecting instrument that came to prominence in connection with the Bikini bomb tests, has been put to use in England in tracking down beetles whose larvae are the crop pests known as wireworms. The technique is described in *Nature* (Oct. 19) by G. A. R. Tomes of Twentieth Century Electronics and M. V. Brian of the Rothamsted Experimental Station.

The adult beetles seldom fly, but do migrate by walking on the ground or burrowing beneath it. To study the rate and distances of such migrations, tiny disks of radioactive material were glued beneath the wing-covers of captured specimens, which were then released. The Geiger-Muller counter, of a special type, was carried over the ground, its ticking indicating where the radioactively "tagged" beetles were. It could spot them even when they had burrowed as much as four inches deep.

Science News Letter, November 30, 1946

CHEMISTRY

N-Propoxy Is 4,000 Times Sweeter than Sugar

► NEW SWEETNESS has come to a world troubled with a sugar shortage. It is a new compound 4,000 times as sweet as canesugar.

By far the sweetest substance known to man, the sugar substitute was developed in the Netherlands during the war, Prof. Pieter Eduard Verkade of Delft Technical University reported to the Chicago section of the American Chemical Society. The sweetening agent is now being manufactured in Europe, and an application for an American patent has been filed.

The new sweetening agent is derived from benzene and chemically is 1-n-propoxy-2-amino-4-nitrobenzene or n-propoxy for short. On your tongue, the tiniest pinch of the substance would still be tasted a half hour later.

Saccharin, the common sugar substitute derived from coal tar, is only 200 to 700 times as sweet as sugar, compared with the new compound's 4,000 times as sweet. Another substitute, dulcine, is 70 to 250 times as sweet. At your dinner table, the new benzene derivative could be diluted with lactose or milk sugar down to only 500 times the sweetness of cane sugar.

Easily obtained in the pure state, the new compound is in the form of orange crystals. The sweetener is only slightly soluble in water, but Prof. Verkade said its great sweetness made it satisfactory.

Science News Letter, November 30, 1946

INVENTION

Sealed Beam Spotlight Developed for Cars, Boats

► WITH A RAY four times more powerful than a sealed beam automobile headlamp, a new sealed beam spotlight for cars and boats has been demonstrated.

The light was developed from the landing lights of wartime aircraft and has a parasol-shaped filament shield to eliminate stray light and prevent a blinding glare. The lamp, built by Westinghouse engineers, has a half-mile range.

Science News Letter, November 30, 1946

IN SCIENCE

SCIENCE FIELDS

ENGINEERING

Aluminum Shortage Delays Housing Program

► ALUMINUM shortage is delaying the housing program. Houses made largely of this light metal were expected to help others of lumber and brick meet America's present needs. Now it looks as if aluminum-house production this winter will fall below expectations.

Aluminum production in the United States will approximate 800,000,000 pounds this year, government officials estimate. Additional aluminum will be obtained from other countries. But the needs are some 40% greater than the total probable supply.

Canada produces considerable aluminum. The present production, however, is being stockpiled for shipment to England in the spring. American producers are hoping that part of it can be obtained now for use in the United States by a three-way agreement of the countries. Under the plan America would ship early 1947 production to the United Kingdom in repayment.

Plants are operating now near full present capacity but will soon be prepared for greater output. A limited supply of commercial aluminum for some purposes is obtainable from scrapped airplanes by melting down the metal in furnaces at a temperature of about 1,350 degrees Fahrenheit. Recovery is about 80 percent.

Science News Letter, November 30, 1946

MEDICINE

Silicosis Is Not Threat To Workers' Health

► SILICOsis, once great hazard to the health of industrial workers, is no longer a threat.

In one research project involving 28 plants, having operations using millions of tons of dangerous silica, only three plants were found to have silicosis hazards, and these hazards were readily overcome.

This triumph of scientific research to protect workers' health was announced by Dr. F. R. Holden, W. C. L. Hemeon and T. F. Hatch of the Industrial Hy-

giene Foundation at its meeting in Pittsburgh.

"The dangerous trades of our fathers have all but disappeared," they reported.

Potentially poisonous dusts, fumes and gases can and are being used every day in modern industry without danger.

"Dust control continues to occupy the major place in the entire array of industrial health problems with which we are concerned," the scientists stated. "It is necessary to distinguish between the silicosis dust problem in industry and the far more common nuisance dust problem. Not infrequently we find nuisance dust exposures to be more injurious to the mechanical equipment than to workmen. Good progress has been made in research directed toward more exact measurement and identification of different kinds of dust."

Science News Letter, November 30, 1946

PHOTOGRAPHY

Army Camera Photographs Ten Miles Above Surface

► THE FACE of the earth will hide few secrets from a new Army camera. It is the largest ever built for aerial photography, and will catch details even when airborne 10 miles above the surface.

The 575-pound instrument, with a 100-inch focal length, has unique features to reduce it in size to four feet in height and five in width. It has two mirrors in its optical system to bend the light after it enters the lens. The light enters the lens, is reflected from the first mirror to the second, then to the film, completing the 100-inch light path which forms a figure "4" in a comparatively small, compact area.

Heat control is another feature. It has an interior hot-air circulating system, thermostatically controlled, and a large electrically heated blanket covering its entire exterior. These protections are necessary because of the extreme cold in the very high altitudes at which the camera will be used.

The new camera, now completed and undergoing tests by the Army Air Forces' photographic laboratory, is larger in size and greater in focal length than even the Big Bertha used in the Bikini atomic bomb tests. It will provide 9x18-inch pictures with two and a half times more photographic detail from altitudes up to 10 miles than can be obtained with the best of the older standard cameras now in use.

Science News Letter, November 30, 1946

CHEMISTRY

Improved Cellulose Gum Is Produced for Many Uses

► IMPROVED water-soluble cellulose gum, with hundreds of manufacturing uses ranging from tooth paste and paints to chinaware and rubber, enters commercial production in a new plant of the Hercules Powder Company.

Cellulose gum is not a new product; it has been made in Europe for many years where it is known as sodium cellulose glycolate. Little, however, has been made in America until now, but it will become plentiful as a result of processes developed by Hercules.

The new Hercules cellulose gum will be known as CMC. It is the sodium salt of carboxymethyl-cellulose formed by the reaction of monochloroacetic acid with alkali cellulose. It is adhesive but not sticky. It is insoluble in organic solvents; it not only acts as an emulsifying agent in oil-in-water emulsions, but also protects the emulsion.

Science News Letter, November 30, 1946

CHEMISTRY

Plastic Coating Makes Fabrics Easy to Clean

► HOUSEWIVES will welcome new table covers that can be cleaned on the table with a damp cloth. Office girls will rejoice in a half-pound raincoat that can be tucked away in a corner of their handbag. Both, to be available soon, use a tough and flexible plastic, called vinyl butyral, made by the Monsanto Chemical Company.

The plastic is not a new material. For ten years it has served as an interlayer material for safety glass. Its application as a coating to textiles, however, is new. It affords water and stain resistance without impairing the fabric's original appearance, feel and utility to any measurable extent. It can be applied to most fabrics other than ordinary wearing apparel. The raincoat is made of combined nylon and the vinyl butyral.

The fabric coating applied is a super-thin layer of tightly adhering transparent plastic, doctored with sub-microscopic particles to scatter light rays. It will not chip or peel under normal usage, and is relatively unaffected by heat.

While the treated surface can be kept clean with a damp cloth, the fabric itself may need occasional laundering.

Science News Letter, November 30, 1946

ASTRONOMY

Saturn in Evening Sky

Most brilliant December display is seen in east, where Sirius is the brightest star in the night sky, in constellation of Canis Major, the great dog.

By JAMES STOKLEY

► SATURN alone of the planets is visible in the evening during December, joining the brilliant winter stars which are now swinging into view. The positions occupied by these objects, as they appear at 10 p.m. on Dec. 1 and about 9 p.m. at the middle of the month, are shown on the accompanying charts.

It is to the east that we see the brightest display, and of these the most conspicuous of all is the star Sirius, most brilliant that we see in the night-time sky. It is in the constellation of Canis Major, the great dog, low in the southeast. Just above it is the outstanding constellation of Orion, the warrior, marked by two stars of the first magnitude, Betelgeuse and Rigel. Between them is a very prominent row of three slightly fainter stars which mark the warrior's belt.

Above and to the right of Orion is Taurus, the bull, with a V-shaped group of stars (the Hyades) marking the animal's face. In this is Aldebaran, red in color, indicating his eye. Above and to the left of Orion are the heavenly twins, Gemini, with the two bright stars Castor and Pollux. Below them is our evening planet, Saturn, and a little farther to the right is Procyon, in Canis Minor, the lesser dog. Above Gemini is Auriga, the charioteer, in which bright Capella shines.

Bright Area

In the area of the sky occupied by these constellations there are more bright stars than any other of similar size. It is because they happen to be above the horizon in the evening at this time of year that the winter evening skies are so much more brilliant than those of summer, and not for any greater clarity of the atmosphere, as many people seem to believe.

However, there are other bright stars, too. Low in the northwest Vega is indicated, but this is so low that its full brilliance cannot be appreciated. Actually it is second only in brightness to Sirius. Just above Vega, which is part of

Lyra, the lyre, is Cygnus, the swan, of which the star Deneb is a member.

In the west we can see another familiar figure, the so-called "Great Square of Pegasus." However, the four stars which form a very good square are not all in the constellation of Pegasus, the winged horse. The one in the uppermost corner is Alpheratz, in Andromeda, who was the princess that was chained to the rock in the old mythological tale. Close to Andromeda is Cassiopeia, her mother, represented by an M-shaped constellation.

Only Saturn Visible

Though only Saturn is now visible in the evening, three other planets may be seen in the early morning hours, before sunrise. Brightest by far is Venus, in the constellation of Libra, the scales, which rises in the southeast about three hours before the sun. Close to it in the same constellation and fainter, though still exceeding any other planet or star, is Jupiter. Also this month, on the ninth, Mercury reaches its farthest west of the sun, and then for a few days it can be glimpsed low in the southeast as dawn is breaking.

December also brings a total eclipse of the moon, but not to the United States. This comes on the eighth when the moon enters the shadow of the earth. It will be seen from Alaska, most of the Pacific Ocean, Australia, New Zealand,

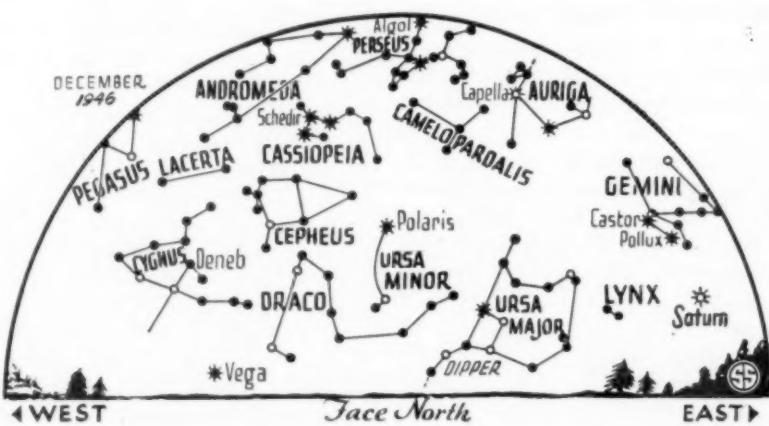
Asia, Africa and most of Europe.

Dec. 14 is important astronomically, especially this year, for 400 years ago on that date there was born one of the greatest—as well as the most colorful—astronomers of all time. This was Tycho Brahe, a Danish nobleman whose labors paved the way for the work of Kepler and Newton in later years. Since he was born in 1546, before Pope Gregory reformed the Calendar in 1582 and dropped 10 days, Dec. 24 will actually be four even centuries after Tycho's birth.

This event occurred in Knud in the present Swedish province Skane, which was then Danish. Tycho studied at the Universities of Copenhagen and Leipzig, and was unfortunate enough to have the end of his nose sliced off in a student duel. Thereafter he always wore an artificial one of brass! The traditional pursuits of his noble family were diplomacy and statecraft, but he became interested in mathematics and astronomy. This interest was stimulated in 1572 when a "new star" flashed out in the constellation of Cassiopeia. He studied it and published a book on it in 1573.

Royal Support

Though there was prejudice against a nobleman engaging in such activities, he soon became known as a great astronomer and by 1576 the Danish king, Frederick II, gave him the island of Hveen, in the sound between Denmark and Sweden, and erected a great observatory for him there. The island is not far from Elsinore, scene of Hamlet's



tragedy. In fact, one can stand on the battlements of Elsinore, where Hamlet is supposed to have met his father's ghost, and see Hven, as it is now called, to the south.

Tycho called his observatory Uraniborg—city of the heavens. Though this was prior to the invention of the telescope, it was here that modern observational astronomy really began, for the instruments that he designed and built were the most accurate that had ever been made and he knew how to use them to secure the greatest precision.

A great comet appeared in 1577 which he observed and showed that it was not in our own atmosphere, as people thought such objects to be. He demonstrated that it was more distant than the moon, and so definitely placed these visitors among the celestial objects. At Uraniborg he had his own printing plant, and from here his results were spread among learned men in all countries.

Support Continued

Even after the death of Frederick II in 1588 royal support continued. The next ruler was Christian IV, who was only 11 when crowned, so a regency ruled until he was 20. One of the regents was a good friend of Tycho's and realized the importance of his work, so the fame of Uraniborg still spread. In 1590 King James VI of Scotland, who later was James I of England, paid him a visit. But in 1594 Tycho's friend died, and when the young king began to rule in his own right Tycho's pension ceased. In the spring of 1597 he left, taking his instruments with him.

Today on Hven, which is Swedish, there is nothing left of the buildings which Tycho built, though the cellars remain, like a sunken garden, and the well which supplied running water to the house, is still there. Nearby is a small museum, erected about a dozen

OBSERVOSCOPE STAR FINDER



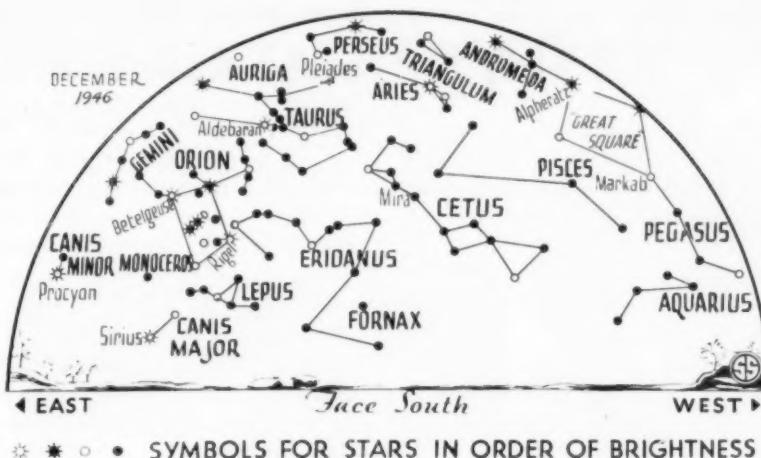
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years ago, to house some of the stones of the building which have been recovered, and a few other relics.

From Hven, Tycho and his retinue first went to Copenhagen, but in June they moved on to Rostock, in Germany. In October he went to the Castle of Wandsbeck, near Hamburg, where he finished and printed with his own presses, which he had brought along, his great work describing the instruments he had used at Uraniborg. Next his wanderings took him to Dresden, and thence to Wittenberg. Finally, in 1599, he went to Prague, where he found the protection of the Emperor Rudolph II.

He was given a castle about 22 miles from the city, where he re-erected his instruments. It seemed as if his great

work might continue, but he died in October, 1601, a little less than 55 years of age. On order of the Emperor he was given an elaborate funeral and was buried in the Teynkirche, in Prague, where his tomb may still be seen.

During his brief activity in Prague, however, students and scholars came to him. Among them was the young German astronomer, Johann Kepler, whose work had already won him renown and had brought an invitation from Tycho to join him "not as a guest but as a dear friend and colleague." Thus it was that Kepler fell heir to Tycho's observational data, a most happy circumstance. As a skillful observer, Tycho probably never had a superior; Kepler, on the other hand, was a brilliant (*See next page*)

Ready November 15, 1946

Germ-Free Life Studies

LOBUND® REPORTS

(No. 1)

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and Robert F. Ervin

Germ-Free Life Applied to Nutrition Studies —James A. Reyniers

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Do You Know?

Potted orange plants often have a black coloration due to a sooty mold which is growing on sweet material exuded by scale insects.

One-fourth of all *patents* registered in the United States Patent Office relate to automobiles.

Curare, the arrow tip poison used by some primitive people, is now employed in the treatment of infantile paralysis.

From page 347

mathematician, though poor eyesight made observational astronomy a difficult task. But Kepler's analysis of Tycho's data led to the former's great laws describing the movements of the planets, and these in turn were generalized by Newton in his theory of gravitation. Thus it is that the name of Tycho Brahe ranks among the first half dozen or so of the greatest astronomers of all time, and this December learned societies throughout the world are commemorating the Four Hundredth Anniversary of his birth.

Atomic bomb elements included in 1946 edition.

Write for special prices to chemistry groups, science clubs, and A. C. S. student affiliates.

Celestial Time Table for December

Dec.	EST	
1	4:47 p.m.	Moon in first quarter
8	12:52 p.m.	Full moon (total eclipse of moon visible in Eastern Hemisphere)
	7:00 p.m.	Moon nearest, distance 221,600 miles
9	4:00 a.m.	Mercury farthest west of sun
11	10:56 p.m.	Moon passes Saturn
12	early a.m.	Meteors of Geminid shower visible
	4:00 a.m.	Planet Uranus nearest, 1,688,000,000 miles
15	5:57 a.m.	Moon in last quarter
17	2:34 a.m.	Algol (variable star in Perseus) at minimum
19	4:07 p.m.	Moon passes Jupiter
	8:40 p.m.	Moon passes Venus
21	11:23 p.m.	Algol at minimum
22	5:54 a.m.	Sun farthest south, winter begins
	7:00 p.m.	Moon farthest, distance 252,600 miles
23	8:12 p.m.	Algol at minimum
	8:06 a.m.	New moon
	3:00 p.m.	Venus at greatest brilliancy
25	5:01 p.m.	Algol at minimum
31	7:23 a.m.	Moon in first quarter

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, November 30, 1946

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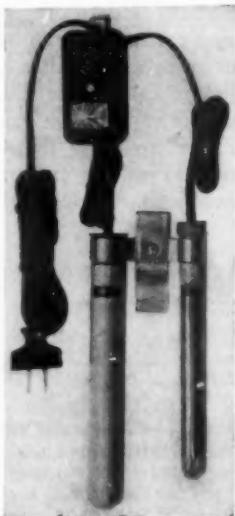
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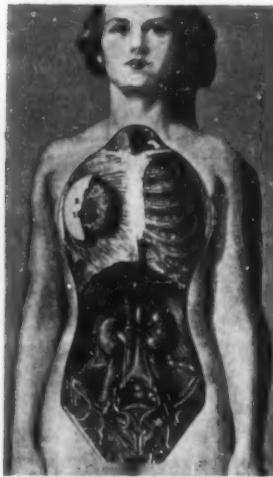
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**Still Unimitated**

► AMBITIOUS dreamers of human flight, from Leonardo da Vinci to the Wright brothers, studied closely the flight of birds, and at long last profited thereby. A modern airplane is like a bird at least to the extent of putting a streamlined covering over the irregular surfaces of its power sources, as a bird streamlines its rather awkward-looking body with smooth feathers.

Some of our newer high-speed planes seem to have been modeled on the lines of a hawk-moth rather than those of a bird. They have the same fineness of fuselage, the same trim and taper wings as those hovering, long-tongued twilight visitants to summer flower-gardens.

However, if an airplane designer were able not only to copy the hawk-moth's smooth lines, but to imitate even a part of the things a hawk-moth can do in flight, he would have trouble taking home all the medals and prizes that would be heaped on him.

The hawk-moth is not only capable of swift, darting forward flight; it can fly backwards, dodge sidewise, stop abruptly in mid-flight and hover motionless in the air. It can rise or drop ab-

ruptly while hovering, swoop with equal abruptness while in flight. In all these marvelous skills it closely resembles the hummingbird, for which it is sometimes mistaken by those who are not close observers.

Add to this the fact that this insect's wonder-wings are also its only propellers!

It is only lately that scientists have been able to get an adequate idea of how an insect uses its wings in flight.

Close watchers with good eyes were able to catch the principal movements of a bird's wings: Leonardo's notebooks are full of sketches showing how carefully he watched the birds he strove to imitate. But the many-fold more rapid beats of an insect's wings defied study until the recent invention of ultra-high-speed motion-picture cameras capable of making thousands of exposures a second. Now we know how an insect flies—but we are still unable to imitate its art.

Science News Letter, November 30, 1946

Books of the Week

ALL BUT ME AND THEE: Psychiatry at the Foxhole Level—Brig. Gen. Elliot D. Cooke—*Infantry Journal*, 215 p., \$2.75. A non-medical report to General Marshall on the author's study of the problem of psychiatric cases in the Army and what was done about them.

ELEMENTS OF PUBLIC ADMINISTRATION: Fritz Morstein Marx, Ed.—*Prentice-Hall*—637 p., \$6.65. The administrative process as an integral phase of contemporary civilization is discussed by 14 experts deeply interested in this work.

FLIGHT TESTING: CONVENTIONAL AND JET-PROPELLED AIRPLANES: Benson Hamlin—*Macmillan*, 147 p., illus., \$5. This book provides the first complete standardization of methods of the analysis of flight test information, and makes available the author's systematized study of flight testing developed during the war, together with considerable new material on turbo-jet-propelled aircraft.

HANDBOOK OF CHEMISTRY: Norbert Adolph Lange, Ed.—*Handbook Publishers, Inc.*, 1767 p.; appendix, 269 p., and index, \$7. Contains essential fact-finding, time-saving chemical tables, formulas and other data for students and teachers of chemistry, physics and chemical engineering. Appendix carries mathematical tables and formulas. Sixth edition revised.

HATCHERY MANAGEMENT: Roland C. Hartman and G. S. Vickers—*Judd*, 404 p., illus., \$4. This revision of the 1932 edition gives considerable material on flock improvement, incubation, hatchery sanitation, advertising and selling.

HOW CAN WE TEACH ABOUT SEX: Benjamin C. Gruenberg—*Public Affairs Committee*, Pamphlet No. 122, 32 p., illus., paper, 10 cents. Several important "don'ts" in sex education are listed for schools, parents and groups endeavoring to guide people in this important field.

AN INTRODUCTION TO MATHEMATICAL GENETICS: Lancelot Hogben—*Norton*, 260 p., tables, ratios and formulas, appendices, \$5. This book, the first of its kind, aims to make mathematical genetics intelligible to readers and students who need assistance before they can consult original sources.

PAPAGO INDIAN RELIGION: Ruth M. Underhill—*Columbia University Press*, 359 p., \$4.50. A scholarly and understanding discussion of rites and beliefs of the Papago Indians of the Arizona reservations,

and a sequel to the author's *Social Organization of the Papago Indians*.

PENICILLIN—ITS PRACTICAL APPLICATION: Alexander Fleming—*Blakiston*, 380 p., illus., \$7. New, authentic, practical, this book tells the general practitioner and surgeon how to use penicillin for best results. Twenty-eight specialists working under the editorial supervision of Dr. Fleming present the latest details as to dosage, forms and methods of administration, prophylactic uses, control, etc.

PLASTICS BUSINESS: Herbert R. Simonds and Joseph V. Sherman—*Van Nostrand*, 439 p., illus., \$5. Here is the first comprehensive survey of the plastics industry analyzing its structure and its trends. It covers the organization of the industry, its growth and development, and gives intimate statistics from individual companies to serve as a guide.

THE PRACTICE OF SEX EDUCATION: Dr. Eustace Chesser and Zoe Dawe—*Roy*, 227 p., diags., \$3. A plain guide for parents, teachers and young leaders who desire to help in this deeply important field.

SILICONES: FOOD FOR IMAGINATION: R. R. McGregor—*Mellon Institute of Industrial Research*, 10 p., illus., paper, free. One of the newest classes of plastics developed during the war was the silicones, and this pamphlet outlines the constitution and behavior of these new materials.

THE SOUTH AMERICAN HANDBOOK, 1946—Howell Davies, Ed.—Trade and Travel Publications, Ltd., *H. W. Wilson*, 810 p., 23d edition, \$1.25. A standard guide to 23 countries, including Cuba and the Falkland Islands, giving information on history, climate, flora, fauna, resources, government, transportation, monetary and other standards, where to go, what to see, hotels and living costs.

USE OF AUDIO-VISUAL MATERIALS TOWARD INTERNATIONAL UNDERSTANDING: Helen Seaton Preston, Ed.—*American Council on Education*, 168 p., paper, \$1.25. Report of conference sponsored jointly by the American Council on Education and the Film Council of America, June 14-15, 1946.

WHITE CAPS, The Story of Nursing: Victor Robinson—*Lippincott*, 425 p., illus., \$3.75. A factual, thrilling story of nursing from its start under a thatched roof to the tremendous hospitals and laboratories of today.

Science News Letter, November 30, 1946

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• New Machines and Gadgets •

❶ PAPER DISKS for magnetic phonograph records are coated with an iron-oxide emulsion, and can be re-used many times if wiped off with a magnet. A disk carrying a conversation can be mailed and then played back to the receiver in an identical recording-reproducing machine.

Science News Letter, November 30, 1946

❷ SPARKPLUGS have built-in devices for measuring temperatures in the sparking area of the engine. The temperature measuring plug has a central electrode with a hollow center containing a thermocouple using platinum versus platinum-rhodium metals.

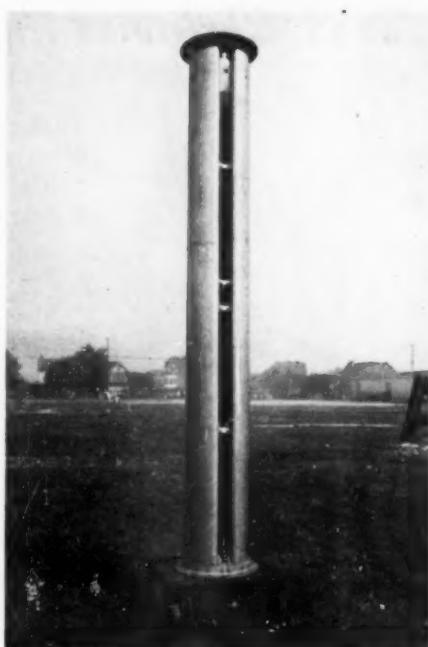
Science News Letter, November 30, 1946

❸ WALKING-TREADS for ice skates, just patented, are quickly attached with a thumb-nut that grasps the center of the skate blade. The blade fits into a central slot on the upper side of the tread, which has a curved lower surface to facilitate walking when off the ice.

Science News Letter, November 30, 1946

❹ VACUUM CLEANER, small enough to be kept in the glove compartment of an automobile, operates off the engine manifold vacuum when the car engine is run at idling speed. Connections are long enough to permit the use of the cleaner in any part of the car's interior.

Science News Letter, November 30, 1946



❺ CYLINDRICAL antenna, a new FM radiator or transmitter, is made of 13-foot units that are 19 inches in diameter, with a narrow slot from top to bottom, as shown in the picture. The cylindrical structure itself is the radiator. The feed line, a single transmission line, runs up the inside along the slot.

Science News Letter, November 30, 1946

❻ SYNTHETIC adhesive, a thermoplastic composition that does not require vulcanization to obtain adhesive strength,

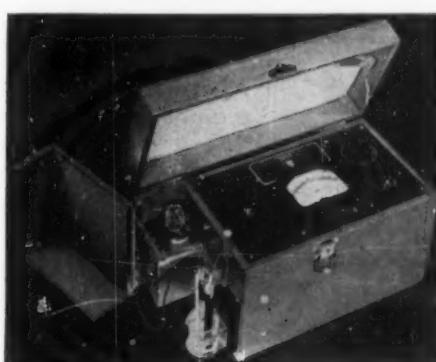
is suitable for bonding Buna-N type synthetic rubbers and vinyl films to rigid surfaces of steel, aluminum, glass, wood or concrete. This cold-setting material dries completely within two hours.

Science News Letter, November 30, 1946

❼ LABORATORY tongs, to handle hot flasks, beakers and evaporating dishes, have jaws of two parallel wires so curved that they can be used safely to hold glass, ceramic or platinum wares while pouring out the contents. Made of aluminum rod, the handles are large for easy grasping.

Science News Letter, November 30, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 339. To receive this Gadget Bulletin without special request each week, remit \$1.50 for one year's subscription.



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